UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,361	11/24/2003	Peter F. Corbett	112056-0141	4709

24267 7590 06/15/2006	EXAMINER
CESARI AND MCKENNA, LLP	BONZO, BRYCE P
88 BLACK FALCON AVENUE	

	ART UNIT	PAPER NUMBER
BOSTON, MA 02210	2113	

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)
Office Action Summary		10/720,361	CORBETT ET AL.
		Examiner	Art Unit	
		Bryce P. Bonzo	2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>24 November 2003</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-63</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-63</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>24 November 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

Non-Final Official Action

Status of the Claims

Claims 1-63 are rejected under obvious type double patenting.

Claims 4-13, 34-41, 43-60 and 61 are rejected under 35 USC §112, 2nd paragraph.

Claims 1-3, 14, 28-32, 61 and 63 are rejected under 35 USC §102(b).

Claim 33 is rejected under 35 USC §103.

Rejections under Obvious-type Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-103 of patent # 6,993,701 contains every element of claim 1-63 of the instant application and as such anticipate claim 1-63 of the instant application.

Claims 1-37 of patent application # 11/303,788 contains every element of claim 1-63 of the instant application and as such provisionally anticipates claim 1-63 of the instant application.

"A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or **anticipated by**, the earlier claim. In re Longi, 759 F.2d at 896, 225 USPQ at 651 (affirming a holding of obviousness-type double patenting because the claims at issue were obvious over claims in four prior art patents); In re Berg, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of obviousness-type double patenting where a patent application claim to a genus is anticipated by a patent claim to a species within that genus). " ELI LILLY AND COMPANY v BARR LABORATORIES, INC., United States Court of Appeals for the Federal Circuit, ON PETITION FOR REHEARING EN BANC (DECIDED: May 30, 2001).

Rejections under 35 USC §112, 2nd paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-13, 34-41, 43-60 and 61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

These claims all contain or depend from a claim which contains a limitation requiring the storage devices themselves be assigned roles of storing either user data or redundancy data. The rejected claims then proceed to ignore this division of which store devices store which data and place of a differing types of data on both types of storage devices. As such the claims contain an internal contradiction.

While striping the redundancy data across the array by be feasible, the claim as

constructed is defective. A fair warning, should Applicant produce a clear claim, Blaum

does disclose the use of RAID 5 and the papers which disclose the use of striping of

parity across a RAID to prevent hotspots (load balancing).

Rejections under 35 USC §102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in
public use or on sale in this country, more than one year prior to the date of application for patent in
the United States.

Claims 1-3, 14, 28-32, 61 and 63 are rejected under 35 U.S.C. 102(b) as being

anticipated by Blaum (United States Patent No. 5,271,012).

As per the claims:

1. A system configured to provide double failure-correction of two or fewer storage

device failures in a storage system, the system comprising:

an array having a number of storage devices, wherein the number of storage

devices is p and wherein p is a prime number greater than two, the storage devices

including two storage devices selected to store redundant information, the remaining

storage devices configured to store data (column 8, lines 20-30); and

a storage module of the storage system, the storage module adapted to

construct the redundant information using a redundant storage algorithm involving

summation or combination computation along row parity sets (rows) and diagonal parity sets (diagonals) of the array for storage on the selected storage devices (column 8, lines 3-18),

wherein the redundant storage algorithm used to construct the two or fewer storage device failures is the same regardless of which storage devices fail or roles of the storage devices when constructing or reconstructing the redundant information or data (column 8, lines 3-18).

2. The system of claim 1 wherein the redundant information is constructed along both diagonals and rows for storage on the selected storage devices, such that neither selected storage device contains solely diagonal or row redundancy information (column 8, lines 42-52).

3. The system of claim 2 wherein the redundant information stored on the selected storage devices interacts such that the redundant information is uniquely determined by row parity and diagonal parity computation contributions (column 8, lines 20-30).

14. The system of claim 1 wherein not all p storage devices are present in the array and wherein contents of the storage devices not present have predetermined and fixed values (column 3, lines 60 through column 4, line 6).

28. A method for protecting against two or fewer disk failures in a storage system, the method comprising the steps of:

providing an array with a number of disks, wherein the number of disks is p and wherein p is a prime number greater than two, the disks including two disks selected to store redundant information, the remaining disks configured to store data (column 8, lines 20-30);

computing the redundant information through summation or combination computation along row parity sets (rows) and diagonal parity sets (diagonals) of the array (column 3, lines 3-20); and

storing the computed redundant information on the selected disks (column 8, lines 3-20).

29. The method of claim 28 wherein the step of computing comprises the step of computing the redundant information along both diagonals and rows for storage on the selected storage devices, such that neither selected storage device contains solely diagonal or row redundancy information (column 8, lines 41 through column 17).

30. The method of claim 29 wherein the step of computing further comprises the step of computing row parity along rows of the array and diagonal parity along diagonals of the array, such that the redundant information ensures that each diagonal and each row have known parity values (column 8, lines 41 through column 17).

31. The method of claim 30 wherein the step of computing further comprises the step of computing the redundant information using exclusive-OR logical operation computations (column 4, lines 7 through 26).

32. The method of claim 31 wherein roles of the disks in the array are irrelevant with respect to computation of contents of any two failed storage devices (column 10, lines 20 through column 11, lines 20).

61. Apparatus for protecting against two or fewer disk failures in a storage system, the apparatus comprising:

means for providing an array with a number of disks, wherein the number of disks is p and wherein p is a prime, the disks including two disks selected to store redundant information, the remaining disks configured to store data (column 8, lines 20-30);

means for computing the redundant information from both diagonal and row parity computation contributions (column 8, lines 3-20); and

means for storing the computed redundant information on the selected disks, such that neither selected disk contains solely diagonal or row parity information (column 8, lines through column 10, lines 17).

63. A method for correcting double failures within data adapted for transmission over a communication medium, the method comprising the steps of:

dividing the data into packets for transmission over the communications medium (Figure 1);

organizing the packets into one or more groups adapted to employ a uniform and symmetric double failure-correcting algorithm to protect against two or fewer failures of packets within any one of the groups, wherein each group comprises p packets with p equal to a prime greater than two and wherein a value of p may vary among the groups, and wherein two packets of each group are selected to store redundant information, the remaining packets of the group configured to store data (column 8, lines 20-30);

computing the redundant information through summation or combination computation along row parity sets (rows) and diagonal parity sets (diagonals) of the group (column 3, line 20-30); and

storing the computed redundant information in the selected packets (Figure 1).

Rejections under 35 USC §103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blaum (United States Patent No. 5,271,012).

Blaum does not explicitly disclose:

The method of claim 28 wherein the step of computing further comprises the step of computing by addition over bit fields that are one or more bits wide.

While Blaum does disclose the striping of data, and hence the blocks of data being a bit or larger (as a bit is the smallest unit of data), Blaum calculates parity via XOR's. Official Notice is given that calculation of parity by addition residue is a well known in the art of error coding. Blaum even acknowledges there are many simple algebraic and convolution codes which can be used to determine parity. Addition based parity is interchangeable functionally with XOR parity yielding identical results. Thus it would have been obvious to one of ordinary skill in the art at the time of invention to implement the XOR based parity for the redundancy calculations of Baum in addition form thus avoiding the use of the larger XOR gate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryce P. Bonzo whose telephone number is (571)272-3655. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on (571)272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bryce P Bonzo
Primary Examiner
Art Unit 2113